United States
Department of
Agriculture

Service Center
Modernization Initiative
(SCMI)

STANDARD

For

Map Accuracy

DRAFT

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Introduction

As directed by the Secretary of Agriculture's March 16, 1998 memorandum, the Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), and Rural Development (RD) agencies are co-locating offices, modernizing business processes, and partnering to achieve a "one-stop service" for United States Department of Agriculture (USDA) customers at their county-based field offices (Service Centers). One of the major components of the modernization initiative involves the implementation of a Geographic Information System (GIS) across each of the Partner Agencies and in all 2,550 Service Center offices. A Service Center Data Team has been chartered with the overall responsibility for implementing an infrastructure for management of data resources for the Partner Agencies. The GIS Standards Team 5 was formed to address specific data management issues regarding geospatial data.

The individuals who contributed to the development of this standard are:

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Figure 1 - Working group list

RECORD OF CHANGE

Revision/ Change Number	Update Number	Change Date	Description/Reason for Change	Sections Affected

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MAP ACCURACY STANDARD

1. Overview

The objectives of this standard are to help in managing United States Department of Agriculture (USDA) Service Center Modernization Initiative (SCMI) geospatial data by establishing map accuracy standards. It supports the concurrent USDA Service Center Modernization Strategy to develop a basic nationally consistent set of core geospatial data that will provide a foundation on which to base business applications. The *USDA Service Center Geographic Information System (GIS) Strategy* [A5] first defined a list of geospatial datasets required to provide a foundation on which to base business applications. The *Geospatial Data Acquisition, Integration, and Delivery National Implementation Strategy Plan* [A1] further refined and expanded this list.

This document relates to other SCMI geospatial standards including SCMI Std 003, *Standard for Geospatial Data Set Metadata* [A2][1], SCMI Std 005, *Standard for Geospatial Feature Metadata* [A3], SCMI Std 007, *Standard for Geospatial Data* [A4], and the *USDA Service Center Initiative Directory Structure and File Naming Convention Change Control Policy* [A6]. It also relates to *Manual for Managing Geospatial Datasets in Service Centers* [A7]. These documents many appear to be dated but are still relevant and are revised as needed.

This document directly relates to SCMI Std 010-01, *Definitions for Map Accuracy* [A8] which specified terminology that facilitates identifying sources of error in image and vector maps

Appendix A of this standard provides bibliography references to the documents listed above.

1.1. Scope

The scope of this standard is to define map accuracy standards and trade-offs for the *geospatial dataset collection* (physical repository of data) that resides at a Service Center. This standard shall apply to the set of nationally consistent core geospatial data layers first defined in the *USDA Service Center Geographic Information System (GIS) Strategy* [A5].

1.2. Purpose

GIS for the Service Center comprises nationwide coverage of more than 20 common *geospatial datasets* (a group of similar spatial phenomena) that are collected and distributed at the county level of geography. These datasets all have actual or implied accuracy.

The purpose of this document is to identify standards regarding sources of error in image and vector maps. It also covers cost/benefit ratios for obtaining accuracy for existing common geospatial dataset categories. In addition, the objective is to enable customers to make correct visual interpretations of digital imagery and informed decisions about the quality of the map that is produced from interpretations of imagery.

This document will continue to evolve as nationally consistent datasets are provided to the service centers. This standard will be placed under configuration management and maintained through a

[1] The number in brackets corresponds to those of the bibliography in Appendix A.

structured change control process. This will be done because the impact of changing this standard can be great on those applications that use the data and for those who provide the data. The change control process will allow proposed changes to be reviewed and discussed by those affected by the changes.

Nationally fielded applications will be developed that rely on the nationally consistent set of geospatial data. These applications will rely on the integrity of the data in meeting the specifications in this standard. Applications that are built locally for a Service Center or for data that is acquired locally shall adhere to these standards.

1.3. Acronyms and abbreviations

APFO	Aerial Photography Field Office
ASPRS	American Society of Photogrammetry and Remote Sensing
CLU	Common Land Unit
DOQQ	Digital Ortho Quarter Quad
FGDC	Federal Geographic Data Committee's
FSA	Farm Service Agency
GIS	Geographic Information System
GSD	Ground Sample Distance
MDOQ	Mosaicked Digital Ortho photo Quarter quads
NAD	North American Datum
NCSSA	National Cartographic Standards for Spatial Accuracy
NDOP	National Digital Ortho Program
NMAS	National Map Accuracy Standards
NRCS	Natural Resources Conservation Service
NSDI	National Spatial Data Infrastructure
NSSDA	National Standard for Spatial Data Accuracy
RD	Rural Development
RMSE	Root Mean Square Error
SCA	Service Center Agency
SCMI	Service Center Modernization Initiative
SDTS	Spatial Data Transfer Standard
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

2. Background

The Service Center Agencies are entering a new era with respect to the use of orthophoto imagery. Presently, USDA maintains technical control over the processing of imagery. The department has contracted commercial vendors and public agencies to collect imagery. Previously, the United States Geological Survey (USGS) was a key agency that provided data to USDA. The USDA exercised authority to post-process this imagery for use by its internal and external customers which ensured a level of quality. This post-processing ensured a level of quality. The post-processing done at APFO (creating and color balancing MDOQs) is very different than the processing described in the next paragraph.

Now USDA is presented with the opportunity to obtain complete national imagery databases from commercial vendors who have already performed the post-processing of digital imagery. In addition, the commercial operations offer to host the imagery on their own servers. These offers are particularly appealing in light of the budgetary restrictions with which the federal government is presented. Also, commercial vendors in some cases are better situated to technically manage the web farms that will see a large volume of activity. This opportunity presents a new challenge for USDA in ensuring the quality of imagery provided to its customers.

In essence, responsible managers will need to decide the amount of post-processing vendors will perform on data they supply to the agency. What level of quality do we specify as acceptable? To what extent do we partner with these organizations to achieve this level of quality? Viewing the post-processing that vendors perform as a black box is not the solution. Our obligation to our customers is to guarantee a specified level of accuracy. For programs such as National Agriculture Imagery Program (NAIP) and Natural Resource Inventory (NRI), this is already being done.

The orthophoto imagery has an effect on vector data sets that are produced from the imagery through heads-up digitizing. The resulting vector map data can not have a higher accuracy than the source image map. The vector interpretations are predicated on having accurate imagery to view.

3. Definitions

3.1. Accuracy

Accuracy refers to the maximum error to be expected in the values of a dataset. [A8]

The accuracy of the dataset is estimated by comparing a sample of the data with reference information of higher accuracy that is considered correct. Thus, an accuracy assessment is a statistical measure of the maximum amount of error that is expected to occur. It has two components:

1. Magnitude of error that is calculated from the sample
2. Probability (confidence level) that the data will have accuracy equal to or greater than this magnitude (the confidence interval is usually 90 – 95 %)

Many users are enamored with the resolution of the imagery. While this is important for discerning features positional accuracy may be of more importance.

3.2. Remote sensing Accuracy

The document, SCMI Std 010-01 *Definitions for Map Accuracy* detailed various components of map accuracy. Briefly summarized here for ease of reader reference, remote sensing accuracy consists of:

- Positional Accuracy
  - Horizontal Accuracy
  - Vertical Accuracy
- Classification Accuracy
- Ground Sample Distance (GSD)

Collection Ground Sample Distance (GSD)
Product Scale
Visual Interpretation

The factors affecting accuracy of imagery obtained from image data capture (aerial photographs and photogrammetric analysis):

1. ***Scale*** of imagery, which is affected by:
    a. flying height of platform
    b. focal length of the camera lens
    c. Sensor dimension and sensor pixel size
2. ***Ground Resolution*** of the imagery
    d. digital imagery – Ground Sample Distance (GSD)
    e. film imagery – Ground Resolving Distance (GRD)
3. ***Base–height Ratio*** – the degree of separation between two images of the stereo pair relative to the flying height
4. Accuracy of the ground control point measurements and digital elevation model
5. Performance characteristics of the photogrammetric instruments used. This includes Airborne GPS, IMU, scanning equipment, and ortho production software

3.3. Vector Accuracy

Vector accuracy is affected by:

- Source
- Tools
- Process
- Projection

3.3.1. Vector Accuracy - Source

All the factors detailed above affect the quality of the source imagery. Certainly, the accuracy of vector maps resulting from head-up digitizing of images can be no better than the source.

3.3.2. Vector Accuracy - Tools

3.3.3. Vector Accuracy – Process

The accuracy of the vector maps that are a result of heads-up digitizing is greatly affected by the process of digitizing. This might be termed “User Error”. A study was conducted by the Farm Service Agency (FSA), Aerial Photography Field Office (APFO) on Common Land Unit (CLU) polygon digitizing entitled “CLU Digitizing on MrSID Compressed Imagery” [A9]. The objective was to determine if there was more error when digitizing using compressed county mosaics than there was from using the original 7.5 minute quadrangles. It was hypothesized that digitizing from MrSid imagery would produce more error because the MrSID wavelet compression is a lossy algorithm and some of the original image data is lost.

The main focus of this research and the theory of the APFO study was that digitizing differences by individuals could actually introduce more error than the compression process itself. Ten people with varying levels of GIS and digitizing experience digitized the same 32 acre field three times.

The result was that the average area measured using the original imagery had a 0.1 acre difference than the average area using the MrSID compressed imagery. When making careful comparisons between the compressed and uncompressed imagery no offset was found between the two types of imagery.

The largest factor was “User Error” or the image interpretation skill and experience, as well as the attitude or professionalism of the person digitizing.

3.3.4. Vector Accuracy – Projection

The type of projected coordinate system used to create maps can significantly affect accuracy. A map projection is a device for representing all or part of a round body on a flat sheet. Since this cannot be done without distortion, a projection must be chosen for the characteristic which is to be shown accurately at the expense of others, or a compromise of several characteristics. Every system will preserve certain types of accuracy at the expense of others.

The characteristics normally considered in choosing a map projection are the following:

- *Area* – Map projections can be designed to be equal-area so that one part of the map covers the same real world area as another part of the map. This means that shapes, angles and scale must be distorted on most parts of the map.
- *Shape* – Many projections are conformal or orthomorphic in that the shape of every small feature is shown correctly. A large area will be shown as distorted in shape even though small features are shaped correctly. An important point is that relative angles at each point and the local scale in every direction around any one point are constant.

To illustrate the effects of projection on area, a polygon of the Fort Worth federal center was created from surveyed points in a North American Datum (NAD) 1983 geographic shape file. In both Universal Transverse Mercator (UTM) and an Albers projected data frame the area for these polygons is around 95 acres.

When the same points are placed in the data frame with a Mercator world projection and the polygon is created the area calculation is 133 acres.

4. National Standard for Spatial Data Accuracy (NSSDA)

The following is taken from: Geospatial Positioning Accuracy Standards Part 3, National standard for spatial data accuracy. FGDC-STD-007.3-1998 [A10]. The Federal Geographic Data Committee (FGDC) coordinates the development of the National Spatial Data Infrastructure (NSDI).

The NSSDA uses Root-Mean-Square Error (RMSE) to estimate positional accuracy. RMSE is the square root of the average of the set of squared differences between dataset coordinate values and coordinate values from an independent source of higher accuracy for identical points.

Accuracy is reported in ground distances at the 95% confidence level. Accuracy reported at the 95% confidence level means that 95% of the positions in the dataset will have an error with respect to true ground position that is equal to or smaller than the reported accuracy value. The reported accuracy value reflects all uncertainties, including those introduced by geodetic control coordinates, compilation, and final computation of ground coordinate values in the product.

The National Standard for Spatial Data Accuracy was developed by the FGDC *ad hoc* working group on spatial data accuracy, with the intent to update the United States National Map Accuracy Standards (NMAS) (U.S. Bureau of the Budget, 1947). The American Society of Photogrammetry and Remote Sensing (ASPRS) document: Accuracy Standards for Large-Scale Maps (ASPRS Specifications and Standards Committee, 1990) formed the basis for update of the NMAS. The NSSDA, in its former version as the draft National Cartographic Standards for Spatial Accuracy (NCSSA), extended the ASPRS Accuracy Standards to map scales smaller than 1:20,000. The NCSSA were released for public review through the Federal Geographic Data Committee and were substantially rewritten as a result.

4.1.1. Relationship between NSSDA and NMAS (horizontal)

NMAS (U.S. Bureau of the Budget, 1947) specifies that 90% of the well-defined points that are tested must fall within a specified tolerance:

- For map scales larger than 1:20,000, the NMAS horizontal tolerance is 1/30 inch, measured at publication scale.
- For map scales of 1:20,000 or smaller, the NMAS horizontal tolerance is 1/50 inch, measured at publication scale.

4.1.2. Relationship between NSSDA and ASPRS (horizontal)

The document: ASPRS Accuracy Standards for Large-Scale Maps (ASPRS Specifications and Standards Committee, 1990) evaluates positional accuracy for the x-component and the y-component individually. Positional accuracy is reported at ground scale.

Class 1 horizontal (x or y) limiting RMSE for various map scales at ground scale for *metric* units

Planimetric Accuracy Limiting RMSE (meters)	Map Scale
0.0125	1:50
0.025	1:100
0.050	1:200
0.125	1:500
0.25	1:1,000
0.50	1:2,000
1.00	1:4,000
1.25	1:5,000
2.50	1:10,000
5.00	1:20,000

Table 4 - ASPRS Accuracy Standards for Large-Scale Maps

4.1.3. Accuracy Test Guidelines

According to the Spatial Data Transfer Standard (SDTS) (ANSI-NCITS, 1998), accuracy testing by an independent source of higher accuracy is the preferred test for positional accuracy. Consequently, the NSSDA presents guidelines for accuracy testing by an independent source of higher accuracy. The independent source of higher accuracy shall be the highest accuracy feasible and practicable to evaluate the accuracy of the dataset.

The data producer shall determine the geographic extent of testing. Horizontal accuracy shall be tested by comparing the planimetric coordinates of well-defined points in the dataset with coordinates of the same points from an independent source of higher accuracy. Vertical accuracy shall be tested by comparing the elevations in the dataset with elevations of the same points as determined from an independent source of higher accuracy.

Errors in recording or processing data, such as reversing signs or inconsistencies between the dataset and independent source of higher accuracy in coordinate reference system definition, must be corrected before computing the accuracy value.

A minimum of 20 check points shall be tested, distributed to reflect the geographic area of interest and the distribution of error in the dataset. When 20 points are tested, the 95% confidence level allows one point to fail the threshold value, as given in product specifications.

If fewer than twenty points can be identified for testing, use an alternative means to evaluate the accuracy of the dataset. SDTS (ANSI-NCITS, 1998) identifies these alternative methods for determining positional accuracy:

- Deductive Estimate
- Internal Evidence
- Comparison to Source

5. Standards of Accuracy for Existing Datasets

The estimated accuracy of the source imagery for government sources of data, in meters at a 90% confidence level is as follows:

Source	Meters at 90%
DOQQ	8.18
2 meter NAIP	17.31
1 meter NAIP	8.65
Aerials Express (AE) 15 meter mosaic of world	1.73
USGS National Map cities	3.67
1m Ortho	7.00
eSat (LandSat) World	250

Table 5.1 - Estimated Accuracy in Meters at 90% Confidence

Accuracy derivation

USGS - CE95 of 5.19 computed by multiplying x,y RMSE of 2.12 with 2.45

AE	- From Vendor
DOQQ	- Quoted accuracy of CE90 10.16 converted to CE95 through multiplying 4.7255 (x/y RMSE 10.16/2.15) by 2.45
1m NAIP	- CE90 accuracy given by product of 5(RMSE) and 2.15
2m NAIP	- CE90 accuracy given by product of 10(RMSE) and 2.15
eSat World	- Landsat 7 CE90 accuracy

1m Orthoimagery – CE90 of 7 converted to CE95

5.1. National Agricultural Image Program (NAIP)

The following statements about accuracy of NAIP are extracted from a 2007 NAIP .sid.txt metadata file.

NAIP acquires digital ortho imagery during the agricultural growing seasons in the continental U.S. A primary goal of the NAIP program is to enable availability of ortho imagery within a year of acquisition. NAIP provides four main products:

- 1 meter ground sample distance (GSD) ortho imagery rectified to a horizontal accuracy of within +/- 5 meters of reference Digital Ortho Quarter Quads (DOQQ's) from the National Digital Ortho Program (NDOP)
- 2 meter GSD ortho imagery rectified to within +/- 10 meters of reference DOQQs
- 1 meter GSD ortho imagery rectified to within +/- 6 meters to true ground
- 2 meter GSD ortho imagery rectified to within +/- 10 meters to true ground.

The tiling format of NAIP imagery is based on a 3.75' x 3.75' quarter quadrangle with a 300 meter buffer on all four sides. NAIP quarter quads are formatted to the UTM coordinate system using NAD83. NAIP imagery may contain as much as 10% cloud cover per tile.

The following paragraphs in this section are extracted from: Ortho Imagery-National Agricultural Imagery Program, Data Management Plan, January, 2005 [A11]

The one meter product is produced to within 3 meters of the Mosaicked Digital Ortho photo Quarter quads (MDOQs) used to digitize Common Land Unit (CLU) and other Service Center Agency (SCA) datasets. The two meter product is produced to within 10 meters of MDOQs and is intended to be used for aerial compliance and other programs that do not require high spatial accuracy. Map accuracy for the MDOQs and quarter quads applies to a display scale of 1:12,000.

NAIP quarter quads are contracted to register to within three meters of the MDOQ mosaic used to digitize CLU boundaries. The MDOQ mosaics themselves are specified to edge match to within three meters. It is possible that the total mis-registration between NAIP quarter quads could total six meters.

Tiles where less than 90% of measured points fail to meet the three meter horizontal accuracy specification, as measured against the MDOQ mosaic, are rejected.

It should be noted that while “heads up” digitizing at display scales larger than 1:12,000 may allow for more accuracy of the digitized data in a relative sense, i.e., digitized line work may more accurately follow features visible on the ortho image, it will not necessarily lead to an improvement in absolute horizontal accuracy. Similar consideration should be given when using the compressed county mosaics for map revision.

Hardcopy plots of the compressed county ortho mosaics can be horizontally accurate to National Map Accuracy Specifications (NMAS) for 1:12,000 maps

5.2. Common Land Unit (CLU)

The following is extracted from: Common Land Unit Data, Data Management Plan, February, 2005 [A12]

Using rectified photomaps that have been maintained by FSA Service Centers as a reference, tract and field boundaries are “heads up” digitized, using a custom designed tool bar. Digitizing was done at a scale of 1:4800 with digital orthophotography as the base map. Each of the boundaries of the CLU was digitized to a tolerance of three meters (approximately 10 feet) from ground features visible on the digital orthophotography.

Horizontal and Vertical Resolution:
The CLU has a standard of being within three meters of the visible physical feature on the digital base map in the easting or X direction.

Absolute Horizontal and Vertical Accuracy:
The CLU has a standard of being within three meters of the visible physical feature on the digital base map in the northing (Y) and easting (X) directions.

Nominal Scale:
The CLU will be digitized at a base (nominal) scale of no less than 1-inch equals 400 feet (1:4,800) and no more than 1 inch equals 200 feet (1:2,400). This will allow for tight digitizing specifications and accurate data capture.

Horizontal and Vertical Datum:
The datum is North American Datum 1983 for all appropriate areas and World Geodetic System 1984 elsewhere. The vertical datum is mean sea level.

Projection:
The projection of the CLU is UTM. When a UTM zone splits the county, the CLU shall be captured and maintained in the predominant zone. This is the same method that is used in the base imagery from which the CLU is derived.

5.3. Soils (SSURGO)

The following is extracted from: Official Soil Survey Theme, Data Management Plan, January, 2005 [A14]

The accuracy (Horizontal and Vertical Resolution) of these digital data is based upon their compilation to base maps that meet National Map Accuracy Standards. The difference in positional accuracy between the soil boundaries and special soil features locations in the field and their digitized map locations are unknown. The location accuracy of soil delineation on the ground varies with the transition between map units.

For example, on long gently sloping landscapes the transition occurs gradually over many feet. Where landscapes change abruptly from steep to level, the transition will be very narrow. Soil delineation boundaries and special soil features generally were digitized within 0.01 inch of their locations on the digitizing source. The digital map elements are edge matched between data sets. The data along each quadrangle edge are matched against the data for the adjacent quadrangle. Edge locations generally do not deviate from centerline to centerline by more than 0.01 inch.

(Absolute Horizontal and Vertical Accuracy) Spatial data meet NRCS standards and specifications for digitizing outlined in Section 647.07 Digitizing specifications in part 647 Soil Map Development of the NRCS National Soil Survey Handbook

5.4. Wetlands Mapping Standard

The FGDC Working Draft Wetland Mapping Standard [A13] states the following: “When the requirement states that the Horizontal Accuracy must be 5m root mean square error (RMSE) then the features must fall within 5m of the location of the features on the source imagery at least 68% of the time. This nominal positional accuracy conforms to FGDC Digital Ortho Quarter Quadrangle requirement s used by many Federal agencies. This standard requires a nominal horizontal root mean square error (RMSE) commensurate with the context of the mapping as specified in the table below.”

Location	RMSE Meters
Lower 48 States and Hawaii	5
Alaska	25
In-Shore Deepwater	15
Off-Shore Deepwater	N/A

Table 5.2 - Wetlands Horizontal Accuracy (RMSE) requirements

6. NAIP Absolute Accuracy Summary Report

APFO is currently undergoing the process to automate storage of photo identifiable control point data for the inspection process. Using these control points for absolute accuracy is a more solid, intuitive, and understandable specification than relative accuracy.

For further information on the control point data, please contact:

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The following paragraphs are extracted from: 2006 NAIP UT Pilot Project: Absolute Accuracy Summary Report, March 2007 [A15]

The horizontal accuracy of NAIP has always been tied to Government furnished baseline imagery datasets, where 1 meter Ground Sample Distance (GSD) imagery has an accuracy that matches the reference baseline imagery dataset within 5 meters (90% confidence), and 2 meter GSD imagery matches the baseline imagery within 10 meters (90% confidence). This type of accuracy is defined as relative accuracy, and the deliverable is not tied to true ground, rather another imagery dataset, which *was* tied to ground within a certain confidence.

The 2006 NAIP UT Pilot Project sought to tie NAIP imagery to true ground, rather than a reference imagery dataset. This avenue is termed absolute accuracy. This report documents the processes and procedures undertaken to accomplish this task, in an effort to move NAIP to absolute accuracy specifications in the future, resulting in an even more horizontally accurate product than what vendors participating in NAIP are currently required to produce.

Why absolute accuracy over relative accuracy? In short, absolute accuracy is more accurate to true ground than relative accuracy, depending on specifications. A 1 meter resolution aerial image that meets 5 meter relative accuracy specifications means for NAIP that a given tested point/feature on the image is within 5 meters of the same feature on a baseline image. However, if that baseline image meets, say 5 meter accuracy specifications to true ground, the resulting NAIP image could be as much as 10 meters (5 + 5 meters) from true ground in the horizontal direction.

If the same NAIP image as above meets 5 meter accuracy specifications to true ground (absolute accuracy), the image is within 5 meters of true ground, not 10.

Why is relative accuracy not accurate enough? In most cases in the past it has been. However, as more GIS datasets are used in conjunction with NAIP, a higher accuracy is needed based on what NAIP data is used for by FSA, NAIP Partners, and private customers alike. More often than not, imagery is used by customers in a Geographic Information System (GIS) as a base layer, also known as a reference layer. The data is used to reference vector datasets, or to digitize upon them. To satisfy customer requirements these data need to spatially line up as well as possible so as to alleviate horizontal adjustments to those vector datasets and consequentially, future workload based on small base or reference imagery shifts from year to year; one way of accomplishing this is to have a more accurate to ground reference imagery layer to do work upon.

In the end, though, the most engaging factor is in satisfying customer requirements. Moving to absolute accuracy from relative creates a much more accurate, thus a more valuable dataset, and satisfies more customer requirements, which can mean more partnerships. Ultimately, a better product can be achieved for potentially fewer Federal dollars due to the realized increase/enhancement in partnerships with local, State, and Federal entities.

This methodology requires the non-trivial task of establishing a database of “photo identifiable” control points. Note that when the term “photo identifiable” control is used, it refers to a point that is identifiable on a 1 meter resolution image in conjunction with the use of a detailed description, image, or sketch.

Control point datasets used for inspection are only useful if kept secured and secret from vendors. The need for securing and not passing these points out to the public is absolute (other than select points for AT solution as mentioned above); otherwise the vendor may use these specific QC points to rectify images, invalidating inspection processes.

7. Map Accuracy Recommendations

The recommendations are:

1. Use NAIP absolute accuracy methodology where possible to evaluate and establish the quality of source imagery.
2. Easements should be digitized at least to CLU specs: Common Land Unit 8-CM page 6-1 [A14] states: "The CLU will be digitized at a base (nominal) scale of no less than 1-inch equals 400 feet (1:4,800) and no more than 1 inch equals 200 feet (1:2,400). This will allow for tight digitizing specifications and accurate data capture. "

Questions:

1. Should any new applications and tools that are developed adhere to some existing standards for existing data sets?
2. Should standards like National Map Accuracy Standards such as those used for soils be enforced for data captured using the new tools?
3. Should maps developed from "heads up" digitizing such as conservation planning or wetland easements be required to meet the same standards as other datasets.

Notes:

Image data bases such as those used in Microsoft Virtual Earth are intended for visualization and are not developed from planimetric data of know quality. In the strictest definition, these databases are only pictures.

Appendix A – Bibliography

When the following standards are superseded by an approved revision, the revision shall apply.

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[A3] SCMI Std 005, Standard for Geospatial Feature Metadata

[A4] SCMI Std 007, Standard for Geospatial Data
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